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09/249,728	02/13/1999	DANIEL LOPEZ	97123-0	1252

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EXAMINER
DASTOURI, MEHRDAD

ART UNIT	PAPER NUMBER
2623	

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Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	09/249,728	LOPEZ ET AL.
	Examiner	**Art Unit**	
	Mehrdad Dastouri	2623	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>04 January 2002</u> .

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-22</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-22</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

    If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____ .

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

    a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Response to Amendment

1.   Applicants' amendment filed January 4, 2002, has been entered and made of record.

2.   35 U.S.C. 112 rejection of Claims 17-20 has been withdrawn in view of Applicants' amendment.

3.   Applicants' arguments with respect to Claims 1-22 have been fully considered but they are not persuasive.

Regarding independent Claims 1, 9, 17, 19, 21 and 22, Applicants argue in essence that prior arts of record (Aloni et al and neary et al) do not disclose processing digital image data corresponding to a reticle both to identify defects and to simulate a response that would be produces if the reticle were to be utilized in a photolithographic system. The Examiner disagrees and indicates that both prior arts of record disclose identifying defects on a reticle (photolithographic mask). Reference is made to Aloni et al teachings in Column 2, Lines 34-42, and Neary et al disclosure in Column 2, Lines 7-11, wherein the digital images of reticles are clearly utilized for identifying the defects.

Neary et al clearly teach simulation by processing image data of a reticle and utilizes the **Microlithography Simulation Microscope 100** as disclose in Column 3, Lines 55-65. In the process of simulation, aerial images created by illuminating the reticle are utilized (The teachings read Claim 3 limitations as well.).

It is emphasized that the claimed invention is directed to a method, computer readable medium and apparatus for detecting defects in a reticle used in IC chip

fabrication. The language of independent Claims 1, 9, 17, 19, 21 and 22 broadly recite

simulating a response that would be produced if the reticle were to be utilized in a

photolithographic system. Applicants' claimed invention does not specify any further

details concerning the simulation response. The produced response, in broad

interpretation, is identifying that a defected reticle is used in the IC manufacturing line,

and prohibiting further utilization of the damaged reticle. This concept is clearly

disclosed by Neary et al as depicted in Figure 10 and detailed description of Figure 10

flowchart in Column 6 and 7.

4.   Regarding Claims 5 and 12, Mansfield et al undoubtedly disclose the step of ,

categorizing defects based on simulation results produced in step (c). Mansfield et al

disclosure is also based on the simulation of a response if a defective reticle were

utilized in the IC manufacturing line, as clearly indicated in Column 9, Lines 13-21.

This Office Action is made FINAL.

Claim Rejections - 35 USC § 103

5.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

6.   Claims 1-4, 6-11, 13-17, 19, 21 and 22 are rejected under 35 U.S.C. 103(a) as

being unpatentable over Aloni et al (U.S. 5,619,429) in view of Neary et al (U.S.

6,016,357).

Regarding Claim 1, Aloni et al disclose a method for detecting defects in a reticle

used in integrated circuit chip fabrication comprising:

(a) obtaining digital image data corresponding to an image of a reticle (Column 2, Lines

34-37; Column 9, Lines 40-42);

(b) processing the digital image data according to predetermined criteria to identify

defects (Column 10, Lines 8-41).   Aloni et al do not disclose Step (c) concerning

simulating a response that would be produced if the defective reticle were to be utilized

in a photolithographic system, by processing the digital image data corresponding to the

reticle.   Simulation is a well known procedure for modeling manufacturing products as

taught by Neary et al. Neary et al disclose a method of repairing a mask for use in

lithographic manufacturing of semiconductors comprising the step of:

(c) simulating a response that would be produced if a defective reticle were to be

utilized in a photolithographic system, by processing the digital image data

corresponding to the reticle (Figure 2, defect 24; Figures 10 and 16; Column 6, Lines

25-67, Column 7, Lines 1-4, particularly Column 6, Lines 59-65. Simulation is

performed by obtaining aerial images of the defected mask (reticle) and comparing the

aerial image of the defected mask with the aerial image of the ideal mask. Simulation

results indicate the defect deviations 78a and 78b as depicted in Figures 16 and 17.). It

would have been obvious to a person of ordinary skill in the art at the time the invention

was made to modify Aloni et al invention in accordance with the teachings of Neary et al

to simulate a response that would be produced if the defective reticle were to be utilized

in a photolithographic system, by processing the digital image data corresponding to the

reticle because it will provide necessary corrective steps to modify the defective reticle and prevent mass production of the defected masks or reticles.

Regarding Claim 2, Aloni et al further disclose a method according to Claim 1, wherein the digital image data are obtained by scanning the reticle (column 9, Lines 40-42).

Regarding Claim 3, Aloni et al further disclose a method according to Claim 1, wherein the defects are identified in step (b) by comparing the digital image data to reference image data (Column 10, Lines 26-29).

Regarding Claim 4, Neary et al further disclose a method according to Claim 1, wherein step (c) simulated an aerial image, which would be produced by the reticle (Column 6, Lines 59-65).

Regarding Claim 6, Aloni et al further disclose a method according to Claim 1, wherein the digital image data are in raster format (column 9, Lines 40-42. A digital image is inherently in a raster format containing rectangular array of pixels that can be addressed individually.).

Regarding Claim 7, Neary et al further disclose a method according to Claim 1, further comprising a step of modifying a format of the digital image prior to performing step (c) (Figure 3; Column 4, Lines 28-37).

Regarding Claim 8, Neary et al further disclose a method according to Claim 1, further comprising a step of providing a reference simulation for comparison to a simulation produced in step (c) (Figure 10, Step 46; Column 6, Lines 35-45).

With regards to Claim 9, arguments analogous to those presented for Steps (a), (b) and (c) of Claim 1 are applicable to Steps (a), (b) and (d) of Claim 9. Regarding Step (c) of Claim 9, Aloni et al further disclose specifying a window around one of the defects identified in Step (b) (Figure 12, Moving Window 228; Column 25, Lines 63-67, Column 26, Lines 1-22).

With regards to Claim 10, arguments analogous to those presented for Claim 2 are applicable to Claim 10.

With regards to Claim 11, arguments analogous to those presented for Claim 4 are applicable to Claim 11.

With regards to Claim 13, arguments analogous to those presented for Claim 8 are applicable to Claim 13.

Regarding Claim 14, Aloni et al do not specifically disclose a method according to Claim 9, wherein the window is 64 x 64 pixels. The windows specified by Aloni are 32 x 24 pixels. Selection of window size is a designer choice. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Aloni et al and Neary et al combination to specify a window of 64 x 64 pixels because it is one of the most common size of the windows routinely implemented in image processing.

Regarding Claim 15, Aloni et al further disclose a method according to Claim 9, wherein the digital image data processed in step (d) are grayscale data (Column 9, Lines 40-42).

With regards to Claim 16, arguments analogous to those presented for Claim 3 are applicable to Claim 16.

With regards to Claims 17 and 21, arguments analogous to those presented for Claim 1 are applicable to Claims 17 and 21. Regarding Claim 21, Aloni et al further disclose a processor for executing stored program instruction; and a memory connected to processor for storing the program instructions steps (Figure 1/ 2 and 13, Processor 67. Memories for storing the program instruction steps are inherently a part of and necessarily connected to the processor.).

With regards to Claims 19 and 22, arguments analogous to those presented for Claim 9 are applicable to Claims 19 and 22. Regarding Claim 22, Aloni et al further disclose a processor for executing stored program instruction; and a memory connected to processor for storing the program instructions steps (Figure 1/ 2 and 13, Processor 67. Memories for storing the program instruction steps are inherently a part of and necessarily connected to the processor.).

7.   Claims 5 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aloni et al (U.S. 5,619,429) further in view of Neary et al (U.S. 6,016,357) and Mansfield et al (U.S. 5,965,306).

Regarding Claim 5, neither Aloni et al nor Neary et al explicitly disclose a method according to Claim 1, further comprising a step of categorizing defects based on simulation results produced in step (c). Mansfield et al disclose a method of determining the printability of photomasks defects comprising a step of categorizing defects based on the simulation results (Column 7, Lines 41-46; Column 9, Lines 13-21.

Based on the mask critical dimension (CD) errors, the defects are categorized to verify

whether it is necessary to be repaired or not. This will determine if an undesirable

feature on a mask (reticle) is a critical defect or not.).   It would have been obvious to a

person of ordinary skill in the art at the time the invention was made to modify Aloni et al

and Neary et al combination according to the teachings of Mansfield et al to categorize

the defects based on simulation results produced in step (c) because it will limit the

repairs of the defective reticles to those which will adversely affect the performance of

the semiconductor integrated circuit.

With regards to Claim 12, arguments analogous to those presented for Claim 5

are applicable to Claim 12.

8.   Claims 18 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Aloni et al (U.S. 5,619,429) further in view of Neary et al (U.S. 6,016,357) and

Medvedeva et al (U.S. 6,171,731).

Regarding Claim 18, neither Aloni et al nor Neary et al explicitly disclose a

computer readable medium according to Claim 17, comprising at least one of a

magnetic diskette, magnetic tape, a CD-ROM, a random access memory chip, and a

read-only computer memory chip. The indicated memories are the conventional types

of memories as disclosed by Medvedeva et al.   Medvedeva et al disclose an aerial

image simulation system for the aerial images produced by a mask to be used in

patterning an integrated circuit chip including a computer readable medium comprising

at least one of a magnetic diskette, magnetic tape, a CD-ROM, a random access

memory chip, and a read-only computer memory chip (Figure 10; Column 19, Lines 4-

13). It would have been obvious to a person of ordinary skill in the art at the time the

invention was made to modify Aloni et al and Neary et al combination according to the

teachings of Medvedeva et al to include a computer readable medium comprising at

least one of a magnetic diskette, magnetic tape, a CD-ROM, a random access memory

chip, and a read-only computer memory chip because these are the conventional types

of memory routinely utilized in the art.

With regards to Claim 20, arguments analogous to those presented for Claim 18

are applicable to Claim 20.

Conclusion

9.   THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). Applicant is

reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later

than SIX MONTHS from the date of this final action.

Contact Information

10.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Mehrdad Dastouri whose telephone number is (703)

305-2438. The examiner can normally be reached on Monday to Friday from 8:00 a.m.

to 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Amelia Au can be reached on (703) 308-6604.

The fax phone numbers for the organization where this application or proceeding

is assigned are (703) 872-9314 for regular communications and for After Final

communications.

Any inquiry of a general nature or relating to the status of this application or

proceeding should be directed to the T.C. Customer Service Office whose telephone

number is (703) 306-0377.

Mehrdad Dastouri
Patent Examiner
Group Art Unit 2623
March 21, 2002

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